

## Example Control Technology Evaluation

<b>Product Name:</b>	Cam Shaft Cylinder Reengineering Kit
<b>Product Vendor:</b>	Clean Cam Technology Systems
<b>Vendor Address:</b>	7001 Charity Avenue Bakersfield, CA 93308
<b>Product Description:</b> (What is the product, and how does it work?)	The product consists of specific engine retrofit components, including a proprietary cam shaft. The product reduces NOx emissions by increasing the volume of exhaust gas that remains in the combustion chamber after the power stroke. Within the combustion chamber, the residual exhaust gas absorbs heat and reduces the peak combustion temperature which results in lower NOx emissions. The injection timing can then be adjusted (i.e. advanced) to maximize particulate emission reductions, or it can be varied to achieve the desired balance of NOx vs. PM.
<b>Applicability:</b> (What types of engines can the product be installed on?)	The product can be used on eleven models of two-stroke diesel engines manufactured by Detroit Diesel Corporation (DDC) before 1993. The specific models include: 6V92; 8V92, 12V92, 16V92, 3L71, 4L71, 6L71, 6V71, 8V71, 12V71 & 16V71 engines.
<b>Emission Reduction Claim:</b> (What level of emission reduction can be achieved? Address: EC, SOF, and SO <sub>3</sub> ?)	The manufacturer states that engines retrofitted with the product will have emissions of no greater than 1.0 g/bhp-hr of hydrocarbons, 8.5 g/bhp-hr of carbon monoxide, 5.8 g/bhp-hr of nitrogen oxides and 0.16 g/bhp-hr of particulate matter. ARB staff have verified these performance claims.
<b>Emission Test Results:</b> (Summarize emission test results and describe in detail on the attached table.)	8-mode steady-state test data demonstrate that engines retrofitted with the product can meet the emission limits specified above. See attached table for more detail on the emission tests.
<b>Product Costs:</b>	
<b>Initial:</b>	\$3,480 for a three cylinder engines - \$15,680 for a 16 cylinder engine.
<b>Installation:</b>	Similar to standard engine rebuild.
<b>Operating:</b>	N/A
<b>Maintenance:</b>	N/A
<b>Durability / Product Life:</b> (Hours, miles or years)	The manufacturer states that the product's useful life is between 3,000 and 8,000 operating hours, and that the product life is consistent with the durability requirements for new nonroad engines.
<b>Product Warranty:</b>	One year or 3,000 engine hours.
<b>Adverse Impacts:</b>	
<b>Environmental:</b>	No known adverse impacts.
<b>Safety:</b>	No known adverse impacts.

**Special Operating****Requirements:**

(e.g. ultra-low sulfur fuel or  
minimum exhaust  
temperature, etc...)

None

**Current Status:**

(e.g. commercially available,  
or still under development)

The product is commercially available.

**Other:**

(e.g. fuel penalty, reduced  
product life, weight, etc...)

N/A

### List of Stationary &/or Portable Applications

**Product Name:** CCTS Cam Shaft Cylinder Reengineering Kit

Facility / Operator	Engine Information	Permit / Registration	Number of Applications	Time in Service	Emission Limit	Emission Test Results
Gary Drilling	Make: Detroit Diesel Model: 4L71T Application: Generators	PERP Registration Nos. - 100223 - 100295	2	Since: - 12/16/98 - 11/27/97	0.16 g/bhp-hr	See following table.
Gary Drilling	Make: Detroit Diesel Model: 8V92TA Application: Pumps	PERP Registration Nos. - 100124 - 100222	2	Since: - 11/27/97 - 1/28/99	0.16 g/bhp-hr	See following table.

## List of Emission Test Results

**Product Name:** CCTS Cam Shaft Cylinder Reengineering Kit

Test Method	Source Test Company	Engine Information	PM Emission Rate (w/o Controls)	PM Emission Rate (w/ Controls)	Control Efficiency
ISO 8178-C1 40 CFR 89 8-mode steady-state	Southwest Research Institute January 1998	Make: Detroit Diesel Corp Model: 6V-92TA Year: 1984 BHP: 277 Application: Not Reported Configuration: Turbo Fuel Use <sup>1</sup> (lb/hp): 0.414/0.430 Exhaust Temp: Not Reported	0.299 g/bhp-hr	0.149 g/bhp-hr	50%
ISO 8178-C1 40 CFR 89 8-mode steady-state	Southwest Research Institute January 1998	Make: Detroit Diesel Corp Model: 6V-71TA Year: 1983 BHP: 250 Application: Not Reported Configuration: Turbo Fuel Use <sup>2</sup> (lb/hp): 0.384/0.405 Exhaust Temp: Not Reported	0.201 g/bhp-hr	0.091 g/bhp-hr 0.098 g/bhp-hr 0.125 g/bhp-hr	55% 51% 38%
ISO 8178-C1 40 CFR 89 8-mode steady-state	Southwest Research Institute January 1998	Make: Detroit Diesel Corp Model: 6L-71T Year: 1983 BHP: 254 Application: Not Reported Configuration: Turbo Fuel Use <sup>3</sup> (lb/hp):0.424 Exhaust Temp: Not Reported	Not Reported	0.113 g/bhp-hr 0.115 g/bhp-hr 0.117 g/bhp-hr	n/a

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<sup>1</sup> Pre-/Post- Retrofit

<sup>2</sup> Pre-/Post- Retrofit

<sup>3</sup> Post- Retrofit